American Chemistry Council
Statement for the Record
House Energy & Commerce Committee
"Midterm Review and Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles"
September 22, 2016

The American Chemistry Council (ACC) appreciates the opportunity to comment on the House Energy & Commerce Committee hearing entitled, "*Midterm Review and Update on the Corporate Average Fuel Economy Program and Greenhouse Gas Emissions Standards for Motor Vehicles*." The American Chemisty Council, which is committed to sustainable development by fostering progress in our economy, environment and society, represents some 185 companies engaged in the business of chemistry, an innovative $797 billion enterprise that is helping solve the biggest challenges facing our nation and the world.

The business of chemistry, which includes manufacturing of lightweight plastics and polymer composites used by the transportation industry, creates over 800,000 manufacturing and high-tech jobs, plus six million related jobs that support families and communities. The products of chemistry, such as plastics and polymer composites, make it possible to provide clean air and water, safe living conditions, efficient and affordable energy sources, lifesaving medical treatments and safe and innovative transportation solutions. Plastic and polymer composite products contribute robust and distinct economic benefits to our nation. Produced at 1,572 plants in 45 states, employing over 54,000 people and featuring a payroll of over $2.5 billion, advanced plastics and composites in the automotive sector have doubled in use over the last twenty years.

Advanced materials such as plastics and polymer composites are helping to solve many of our nation's transportation challenges, including those faced by automakers to meet greenhouse gas emissions standards and fuel efficiency standards for light-duty vehicles. Developing technology to solve these challenges is a critical requirement to help vehicle manufacturers achieve greenouse gas emissons and fuel economy requirements. Government has an important role to play in ensuring that data and standards exist to achieve lightweighting, while maintaining consumer preference. Together, the plastics and polymer composites industry can successfully harness new and innovative vehicle technology to help manufacturers achieve maximum fuel efficiency and a reduction in greenhouse gases.

ACC applauds the Environmental Protection Agency and the National Highway Traffic Safety Administration and their efforts to create a sustainable transportation platform. ACC supports these efforts and the agencies' recognition in its *Draft Technical Assessment Report for Model Year 2022–2025 Light Duty Vehicle GHG Emissions and CAFE Standards, (81 Federal Register 49217-49220)* of lightweight plastic and polymer composites technologies, which, among other numerous benefits, play an important role in improved design, mass reduction, aerodynamic

improvement, and optimized component integration. Utilizing plastic and composites within the global automotive industry follows well-documented trends of polymer usage to reduce mass and increase efficiency in the civilian and military aerospace industries. Choosing plastic and polymer composites to reduce mass in light-duty vehicles is a decision supported by science that can pay immediate and long term dividends.

The Role of Plastic and Composites in Mass Reduction for Light-Duty Vehicles

Vehicle lightweighting is one of the strategies to achieve reduced greenhouse gas (GHG) emissions and fuel consumption, including techniques for improved design, aerodynamic drag improvement, and optimized component integration. This is an area where lightweight plastic polymer composites can play a significant role in improving the design of new light-duty vehicles. In the last 47 years, the use of lightweight plastics in U.S. automobiles grew from an average of 60 pounds (27 kilograms) per vehicle to approximately 330 pounds (150 kilograms) per vehicle in 2014. More than 50% of a typical vehicle's volume is composed of plastics and polymer composites, but these materials only account for approximately 10% of total vehicle weight.

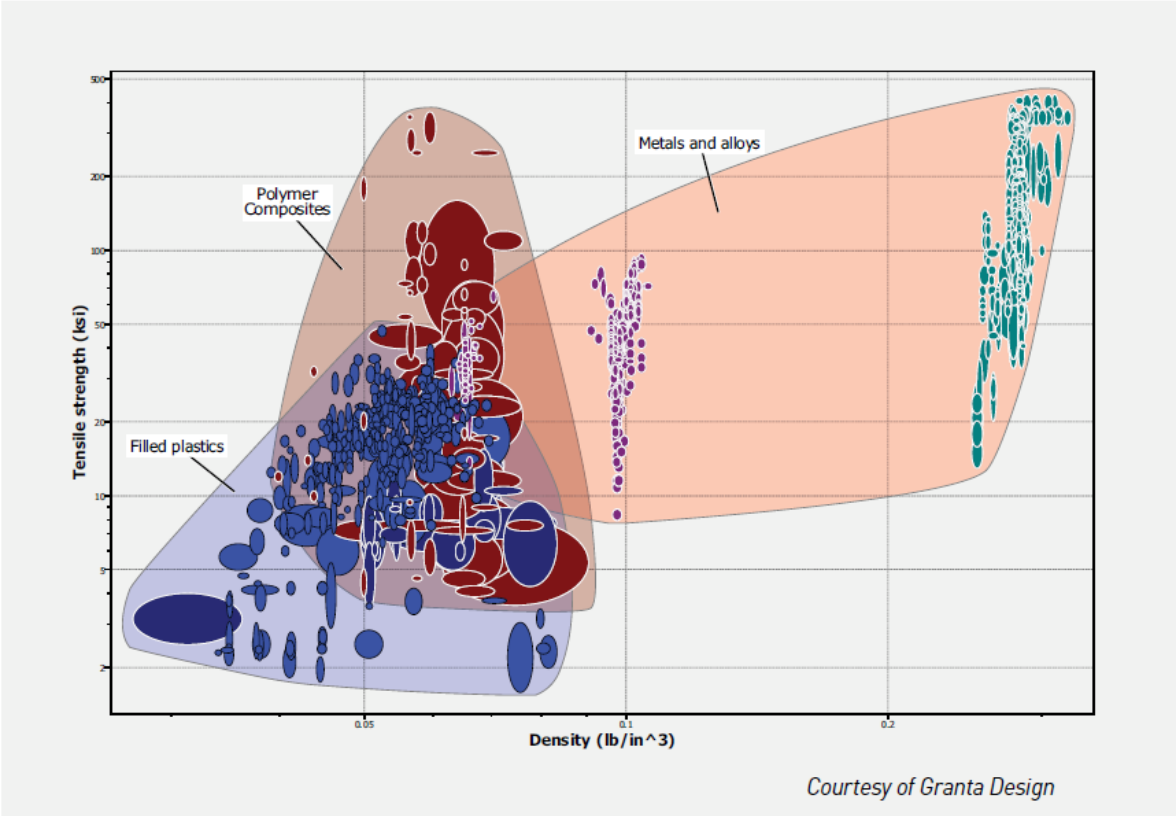
Plastic composites are a combination of tough plastic resins, reinforced with glass, carbon fibers and other materials. These plastic composites are lighter weight than traditional automobile materials, yet maintain high levels of strength and a high resistance to corrosion. Plastic and composite materials provide a way to safely lightweight vehicles while preserving consumer preference through improved design flexibility. Additional properties of plastic and composites, including strength to weight ratio and excellent energy absorption, make these materials ideal for the design and manufacture of light-duty vehicles. The chart labeled "Figure 1" below provides data regarding the tensile strength and density of filled plastics, polymer composites, metals, and alloys. As shown in the chart, there are many plastics and polymer composites that are significantly less dense than most metals and alloys while offering similar tensile strengths. These data illustrate the fundamental physical advantage that many plastics and polymer composites can offer over metallic automotive materials: higher strength-to-weight ratios enable automakers to lightweight while maintaining performance. [1]

As vehicles across the board begin reducing weight to comply with the proposed 2022–2025 Light Duty Vehicle GHG Emissions and CAFE Standards, new lightweight vehicle architectures will emerge. Lightweight plastic and polymer composites have the characteristics needed to help deliver energy saving results while supporting the innovative designs that consumers demand.

In 2014, ACC's Plastics Division published a detailed report titled "Plastics and Polymer Composites for Automotive Markets Technology Roadmap."[Id] This roadmapping process engaged technical experts and leaders from the automotive and plastics and polymer composites industries, including perspectives from original equipment manufacturers, tier suppliers, material developers, researchers, federal agencies, and consultants, to discuss the current limitations to the increased use of plastics and polymer composites and to identify industry-wide actions that can

[1] ACC. "Plastics and Polymer Composites for Automotive Markets Technology Roadmap," 2014, http://plastics-car.com/Tomorrows-Automobiles/Plastics-and-Polymer-Composites-Technology-Roadmap

Figure 1 Tensile strength versus density for filled plastics, polymer composites, and metals and metal alloys



accelerate the increased widespread use of these materials in future vehicles. The roadmap synthesizes the findings from this effort through 2014 and sets a path forward for the plastics and polymer composites and automotive industries through 2030. This roadmap is designed to help the automotive and plastics and polymer composites industries maintain a strong foundation upon which to build partnerships and initiate collaborative programs that address changing market needs. Implementing this roadmap will require significant resources to accomplish both shorter-term priorities and the long-term vision for 2030 and beyond. We would be pleased to meet with the Committee to further discuss our roadmap implementation efforts so that the information can be effectively leveraged to meet the objectives of 2022–2025 Light Duty Vehicle GHG Emissions and CAFE Standards.

Component Integration Benefits

Component integration can reduce weight and decrease manufacturing costs. Cutting edge plastic and composite technology allows manufacturers to optimize parts consolidation and component integration. Choosing plastics allows manufacturers to adopt modular assembly practices, lower production costs and improve energy management. An example on a 2010 vehicle is illustrated by an all new plastic two-shot window lift carrier plate that replaces a metal-intensive assembly comprising 21 components produced with 16+ processing and assembly steps with a plastics-

intensive, 10-component unit produced in 10 assembly steps.[2] The versatility of plastic and composites can revolutionize component design, reduce weight and cut manufacturing costs.

Aerodynamic Drag Improvement

Tough, light weight and versatile plastic and composites allow manufacturers to employ advanced styling techniques for sleeker, more aerodynamic exteriors. Aerodynamic enhancement features on light-duty vehicles often utilize lightweight plastics that add very little weight and maximum design flexibility, translating into large efficiency gains. Lightweight plastic and polymer composites also have excellent durability with damage and corrosion resistance compared to the traditional steel and aluminum alternatives. Those characteristics, along with the benefit of low tooling manufacturing, also make plastic and polymer composites a viable material for side trim, air dams, underbody covers, and more aerodynamic side view mirrors. Additional aerodynamic technologies utilizing polymers can change vehicle shapes, reduce frontal area and seal gaps in body panels. The function of aerodynamic technologies and lightweight plastic and composites go hand in hand for they both have the ability to reduce GHG emissions and fuel consumption.

Plastic Sustainability Benefits

ACC applauds the agencies' consideration of plastic and composite sustainability in the Draft TAR. In addition to the number of emerging technologies and analyses cited, ACC would like to call attention to a new study from Trucost entitled "*Plastics and Sustainability: A Valuation of Environmental Benefits, Costs and Opportunities for Continuous Improvement*"[3] which finds producing consumer goods, including automobiles, with plastics can help lower environmental cost. The report finds that using plastics instead of alternative materials makes vehicles lighter so they use less fuel, saving 323 million liters (89 million US gallons) of gasoline and diesel over the lifetime of vehicles in North America. This results in savings to the North American economy of $2.4 billion in environmental costs over the lifetime of cars sold in 2015, or a net environmental savings of $162 per car in North America.

Safety Benefits

The high strength and energy absorption properties of polymer composites can also improve crash safety by strengthening vehicle compartments to help protect passengers during crashes.[4] Lightweight plastic and composite materials have the ability to reduce vehicle weight without compromising safety, and Congress has taken steps to recognize that fact. Over the last 9 years, Congress has directed NHTSA to create a safety roadmap for lightweight Plastic and Composite

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[2] "Two-Shot Window Lift Carrier Plate," Plasticscar.blogspot.com, November 21, 2012, http://www.plasticscar.blogspot.com/2012/11/two-shot-window-lift-carrier-plate.html

[3] "Plastics and Sustainability: A Valuation of Environmental Benefits, Costs and Opportunities for Continuous Improvement", Plastics.AmericanChemistryCouncil.com, July, 2016, https://plastics.americanchemistry.com/Plastics-and-Sustainability.pdf

4 Aviva Brecher and John Brewer, Volpe National Transportation Systems Center, and Stephen Summers and Sanjay Patel, National Highway Traffic Safety Administration, Characterizing and Enhancing the Safety of Future Plastic and Composite Intensive Vehicles (PCIVs), http://www-nrd.nhtsa.dot.gov/pdf/esv/esv21/09-0316.pdf

Intensive Vehicles (PCIVs) through the THUD Appropriations bills. The report, titled "A Safety Roadmap for Future Plastics and Composites Intensive Vehicles"[5] and published in 2007, evaluates the potential safety benefits of PCIVs to enable their deployment by 2020. ACC continues to work with the entire automotive value chain, including its member companies, automakers, research universities, and government agencies (including NHTSA) to address the Composites Roadmap action items.

In support of the Roadmap's implementation, NHTSA conducted a study to lightweight a 2008 Silverado by approximately 20% utilizing plastic and polymer composites. The lightweight study vehicle was shown to maintain equivalent safety based upon NCAP test results.[6] The study, entitled "Investigation of Opportunities for Lightweight Vehicles Using Advanced Plastics and Composites" was finalized and published by NHTSA in 2012.

ACC applauds the Energy & Commerce Committee for its efforts to advance innovative technologies in the automotive sector. ACC supports this work and highlights the increasingly important role of lightweight plastics and polymer composites in manufacturing innovative automotive technologies. We look forward to continuing to work with the Committee, Congress, and all stakeholders on the development of emerging technologies and manufacturing processes that improve fuel economy and auto safety.

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5 NTHSA. "A Safety Roadmap for Future Plastics and Composites Intensive Vehicles" (DOT HS 810 863), 2007; http://www.nhtsa.gov/DOT/NHTSA/NVS/Crashworthiness/Vehicle%20Aggressivity%20and%20Fleet%20Compatibility%20Research/810863.pdf.

6 NTHSA. "Investigation of Opportunities for Lightweight Vehicles Using Advanced Plastics and Composites" (DOT HS 811 692), 2012; http://www.nhtsa.gov/DOT/NHTSA/NVS/Crashworthiness/Plastics/811692.pdf

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https://www.americanchemistry.com/ The American Chemistry Council (ACC) represents the leading companies engaged in the business of chemistry. ACC members apply the science of chemistry to make innovative products and services that make people's lives better, healthier and safer. ACC is committed to improved environmental, health and safety performance through Responsible Care®, common sense advocacy designed to address major public policy issues, and health and environmental research and product testing. The business of chemistry is an $801 billion enterprise and a key element of the nation's economy. It is the nation's largest exporter, accounting for 14 percent of all U.S. exports. Chemistry companies are among the largest investors in research and development. Safety and security have always been primary concerns of ACC members, and they have intensified their efforts, working closely with government agencies to improve security and to defend against any threat to the nation's critical infrastructure.